By what path such stimulation affects the motor nuclei we do not know, but lesions of this region give rise to a limited degeneration in the pallial tract.

A second situated on the lateral aspect of the surface of the brain, at a point corresponding to the junction of the great striate and occipital tracts.

Stimulation of this area gives rise to complicated movements, which consist chiefly of deglutition, often accompanied by actual pecking and by a rotation of head and neck.

No other motor symptoms were noticed on carefully stimulating the surface of the brain. Nor is any motor defect observed after removal of one hemisphere. After removal of both hemispheres, a condition follows which has been carefully studied by Schrader, and with the description of this author we fully agree. The symptoms vary according to the time which has elapsed since the operation. In the early stage the animal is markedly inert, stands with flexed head, ruffled feathers, and eyes shut; the lack of initiative is pronounced. In the later stage it constantly walks about, and is in a condition of continual unrest, yet always avoids obstacles, and can maintain its equilibrium in various positions.

The relative importance of the mesencephalic spinal system of fibres led us to examine the animals after injury of the optic vesicles for indications of motor defect.

Contrary to what has been noticed in higher animals, we are of opinion that whilst a slight lesion is not followed by any observable motor defect, more pronounced injury gives rise to a weakness on the opposite side, so that the animal falls to that side. If the lesion be very severe, the animal is quite unable to stand, and lies continually on its back.

"On the Reciprocal Innervation of Antagonistic Muscles. Fifth Note." By C. S. Sherrington, M.A., M.D., F.R.S. Received November 29,—Read December 15, 1898.

In a previous communication upon this subject, I gave* the results obtained in an experimental examination of the antagonistic correlation which at least potentially exists in the muscular action of the opening of the palpebral aperture. The *orbicularis palpebrarum* and the *levator palpebræ superioris* are to a certain extent an antagonistic couple. During the course of last year I took opportunity to examine the co-ordination of the same antagonistic muscles in the movement, not of

* 'Journal of Physiology,' vol. 17, p. 27, 1894.

the opening of the palpebral fissure, but of its closure. The observations having been unavoidably interrupted by removal to a new laboratory, it is only recently I have been able to confirm the preliminary observations on a sufficiently extended scale.

The monkey and the cat have been the animals employed. Under deep chloroform narcosis intracranial section of the VIIth cranial nerve was performed at the point where the nerve plunges into the petrosal portion of the temporal bone. In three instances the *nervus octavus*, and the *pars intermedia*, were also severed with the *facialis*. In every case the side selected for operation was the left. The facial palsy caused was not detectable so long as the narcosis was maintained. As that was gradually recovered from, asymmetry of expression, &c., became marked. In those instances in which both the facialis and octavus had been severed, there appeared among the symptoms the following:—Rotatory nystagmus of the left eyeball, some inequality of the pupils—the left being the smaller, some degree of impotence of the eyeballs to move so far to the right as to the left, or, expressed more objectively, the eyeballs were never observed to move freely to the right of the primary visual position, although they frequently moved well to the left; they certainly never moved far to the right; the animals rolled over about the long axis of the body, as mentioned in Magendie's original description of the effect of unilateral section of the pons. The direction of rotation, if traced from the supine position as starting point, was towards the animal's right side, so that that side next after the back lay undermost. The monkey clutched hold of things within reach, with the apparent intention of preventing itself from rolling. If it failed to obtain some support the rolling would continue through a series of complete turns. This was the condition immediately after complete recovery from the narcosis, and at that time the left knee-jerk was less brisk than the right; on the latter side it appeared to be abnormally brisk, but it is difficult to fix a normal. The actual existence of section, and whether it had included both nerves or only one, was always determined by subsequent post-mortem dissection.

As to the eye closure, while the animal was exhausted, or sleepy, or only partially recovered from the chloroform narcosis, there was no obvious difference between the appearance of the eyelids on the two sides, as they rested half open over the globes. When the animal blinked, however, under these conditions, the palpebral opening of the right eye closed, but not that of the left—at least not to any easily perceptible extent. When on the contrary the animal was fully awake and active, with both eyes well opened, it was seen that as the right eye blinked the left eye also did so. By blinking I understand the rapidly executed movement of closure which occurs so repeatedly without attention being directed to it, although it can be voluntary restrained—

the quick movement which may be regarded as an irregularly recurring reflex that doubtless has among its objects the renewal of moisture on the corneal surface, which otherwise would become dry. This natural blinking movement seems in the monkey not to employ the orbital portion of the *orbicularis palpebrarum*, but only the palpebral. It occurs habitually as a bilateral and symmetrical movement. It is far less extensive in action than the closure of the palpebral opening, which ensues when the monkey grimaces on being threatened with a blow. That in the blinking the contraction of the palpebral part of the orbicularis is not however the whole of the muscular mechanism at play, is clear from the fact, that in the awake and active animal with fully opened eyes, the blinking still remains bilateral, subsequent to section of the facialis nerves of one side. The blinking by the right eye was of course normal in character. As the right eye blinked, the upper lid of the left eye quickly dropped three to four millimetres over the globus of that side, and was then synchronously with the lifting of the right upper lid lifted again. The left lower lid was not on any occasion detected to move at all. The quick fall of the upper lid of the left eye must have been due under these circumstances to inhibition of the tonus of the left levator palpebræ superioris muscle. This brings the co-ordination of the reaction into line with that which I have described for other movements under the term reciprocal innervation.

It is interesting that Panas, Sappey, Fuchs, Wilmart and others, who have carefully and particularly studied the mechanism of the closure of the eye, have not attributed any share to an inhibition of the levator palpebræ; one physician, however, Dr. Lor, of Brussels, has argued that in the closure of the human eye such an inhibition does under certain circumstances occur.

"Note on the Densities of 'Atmospheric Nitrogen,' Pure Nitrogen, and Argon." By WILLIAM RAMSAY, F.R.S. Received December 3,—Read December 15, 1898.

M. A. Leduc in a recent paper* has discussed the relation between the density of argon, its proportion in atmospheric nitrogen, the density of the latter, and that of pure nitrogen. It appears to me that he has misunderstood some of the data given by Lord Rayleigh, Dr. Kellas, and myself; and as the question whether the found density of argon corresponds with that calculable from the other data, is in itself an interesting one, I have the honour to present this note to the Society.

* "Recherches sur les Gaz," 'Ann. Chim. Phys.,' September, 1898.